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ABSTRACT

A pilot television series reached some 100,000 Ontario elementary school students with a series on meteorology and ecology. Flexible interactive opportunities (via broadcast, newsletter, phone, mail, personal contact) were utilized; resources not available were provided, while at the same time local options were preserved and encouraged. Use of the phone was limited during the pilot to protect against jamming the system and against incurring project costs beyond means. A questionnaire surveyed student and faculty opinion on the subject of involvement and interaction. The student TV module was found to be the most important interactive component. Ninety-four percent of the teachers responding to a followup questionnaire said the series was more useful than an ordinary educational television series. (WCM)

The Ontario Educational
Communications Authority

Research and
Planning Branch

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Number 30.

Ontario: Our Science Lab
an interactive telecommunications learning system

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CREATING THE SYSTEM

This is an account of a novel educational television series so designed that most of the 100,000 Ontario school children who watched could actively contribute to it themselves. To understand the eager participation of such a large audience in a series of programs on meteorology and ecology, you have to feel some of the excitement yourself. That is why this story is written in the first person in a somewhat dramatic style.

THE BIG IDEA

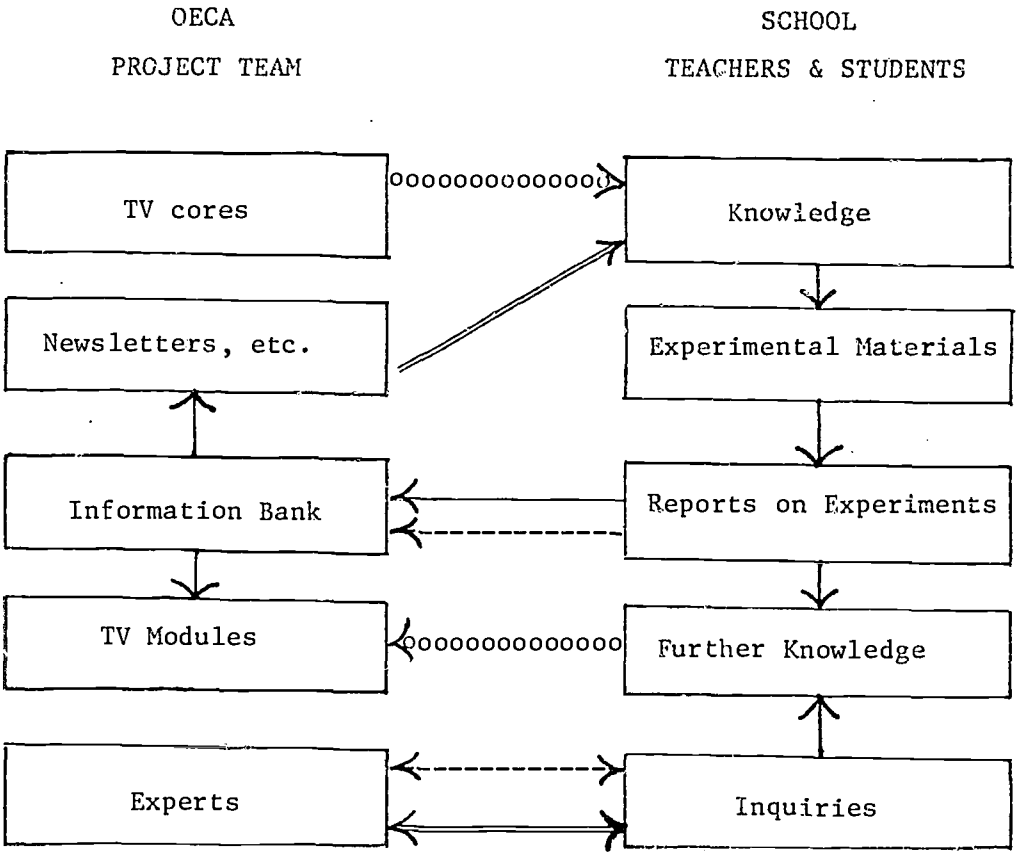
My first contact with what later blossomed into *Ontario: Our Science Lab* came shortly before Christmas, 1972. A former colleague, Bob Tilroe, announced: "Dave Chamberlain and Paul Marquardt of the School and Youth Section, under John Syrett's leadership, are planning a series with the working title *Canada Environment: A science Lab* for the fiscal year. . . .Some form of feedback is needed so that it will become a working model for an interactive learning system that will permit active participation in order to help broaden the awareness and understanding of junior level elementary school students."

Lost in admiration of such a polysyllabic project prescription, I had to admit that I had not the faintest idea how one could possibly link together any sizable hunk of nearly half-million kids in Ontario grades four through six so that they could set up and share a data bank of information about their environment.

In the next few days Bob hit on a possible solution. Get the kids to phone in information. That would gather data fast enough for it to be fed back to them during the next TV program.

"Quite impractical," I said enviously--even though his idea was half-baked I still had not thought of anything at all! "You have got less than 20 minutes a program. If you give feedback during the program there won't be any time for anything else. And how are you going to cope with phone calls from thousands and thousands of students?"

"Those details," said Bob, "We have still to deal with." By the end of the week or so the project team had indeed dealt with them. As Project Co-ordinator, Bob's office was dominated by a huge chart labelled "Educational Television Interaction Model" showing how the resources of OECA and a thousand schools could be mobilized into one great learning system. Here is a very simplified version of that chart.



Key: Direct interaction ————————

TV Broadcast oooooooooo

Mail ═══════

Telephone - - - - - - - -

Let us look at the chart step by step. First OECA would prepare a set of television Core Programs which could be broadcast on their own, without the rest of the learning system, and could even have been selected from previously produced material. It is usual for OECA to publish printed support materials to guide teachers in obtaining optimum educational results from television broadcasts. The support materials for an interactive learning system would differ in that they would be mainly Newsletters to be sent weekly to the schools. Thus, in addition to giving detailed instructions for conducting experiments, together with news about the operation of the system and instructions on when and how to provide further feedback.

When students had acquired the necessary knowledge and materials, they were to carry out experiments and report their results by telephone or mail or both to an Information Bank, which would store the information in a filing system.

Information from the Information Bank would then be collated and fed back in turn to the viewers not only through Newsletters but also more excitingly, by Television Modules produced at the last possible moment. Each Module would be broadcast immediately after a Core Program, though it would also be possible to broadcast the Cores and Modules separately.

If viewers wanted additional information, or advice about conducting experiments, they could phone or write in to Experts who would help with their problems, though viewers would also be encouraged to consult local resources, such as libraries, and experts living in their own vicinity.

In short, the project team with advice from Don Torney, Assistant Superintendent for School and Youth, planned three different modes of feedback to the viewers: broadcast television modules, printed newsletters, and telephone conversations or correspondence with experts.

Obviously all that was going to cost more than could be spared from the meagre budget alloted for the series. So Bob's chart went to Ignacy Waniewicz, Superintendent of Research and Planning. After clarification of basic concepts and rewording of a preliminary project description the proposal went to the next meeting of OECA's Management Advisory Committee with a pitch for more money. It was approved. After all it was Christmas time!

A THOUSAND SCHOOLS JOIN IN

In the New Year things really started to hum. An exciting three-colour poster was designed which included a project description and a detachable enrollment form. Five posters were mailed in tubes to each of the 4,207 public, separate and private elementary schools in the Province. To register their class in *Our Science Lab*, teachers were required to submit enrollment forms to Science Lab headquarters by February 22.

Two shortcomings were soon found in the enrollment form. As only one line was given for the mailing address, many teachers reported a street address without naming their town or city, which had to be inferred from the post-mark or the Directory of Schools. More serious was the fact that the form asked for "Number of Students" and "Grade level(s)" to be stated, but if two or more grade levels were given one could not be sure how many students there were in each grade or even how many there were altogether, what is certain is that 967 schools enrolled by the deadline date and 185 more applied later. As will be explained further on, the late-enrolled classes received Newsletters even though they could not participate fully. So more than a quarter of Ontario schools having grades 4, 5, and 6 were involved in the series. The numbers of students given on the enrollment forms totalled more than 80,000 and it seems not unlikely that if non-enrolled viewers are included the total audience was actually about 100,000.

The project description on the *Science Lab* poster indicated that the programs were designed for Junior Division Science. However, enrollment forms were received for classes in grades 1 through 8, and included special opportunity, hard-of-hearing, physically handicapped and enrichment classes. A number of letters had therefore to be sent to interested teachers explaining the appropriateness of the series for various grade levels.

The poster copy stated that the programs would be broadcast on the OECA Provincial Broadcast Service as well as on Channel 11 and Channel 19. Many teachers did not understand the Provincial Broadcast Service to mean the CBC network. Similarly Channel 11 does not indicate CHCH

Hamilton in many areas of the Province. Consequently it was necessary to tell numerous inquirers on which channel they could receive the series.

Several teachers wrote to ask about the cost of the project to their school, unable to believe that it was all part of OECA's service.

CAMERA...ACTION!

Before the enrollment forms were sent out the Television Core production had started under the aegis of Producer Paul Marquardt, Series Education Supervisor Dave Chamberlain, and Production Assistant Jeanne Mougeot. Don Torney, Assistant Superintendent assisted in decision making.

The ten Core Programs consist of scientific experiments, explanations of environment phenomena and cartoon sequences to illustrate major principles. The animation was conceptualized by Don Arioli of Montreal and produced by Cinera Productions.

Production began on January 29 and each program was completed the Friday before the Wednesday broadcast. Core scripts, written by meteorologist Mike Newark, were revised and finalized by the Education Supervisor on Tuesdays before the Friday completion dates.

Soon after the first broadcast on Wednesday March 28 OECA's Utilization Branch and some teachers reported that the programs moved too quickly and were difficult for the younger students to understand. The Core staff were aware of this criticism and felt that later programs moved more smoothly. The proximity of production dates to broadcast times allowed consideration of such feedback information.

Modules production was carried out by Director/Producer Jason Heileman, Assistant Education Supervisor/writer Mike Comstock, and Production Assistants Susan Clery, Carol Jones and Mary-Louise Lynde.

The five-minute television Module outlined the major experiments and asked students to mail and telephone results. The feedback section which

began with Program 3 included results of student experiments and activities. Selections from students' reports, drawings, and photographs, and even an 8 mm film submitted by St. Mary's School in Fort Frances, were included in the Television Modules.

Module production dates were soon changed from Mondays to Tuesdays to allow inclusion of telephone data collected on Fridays and Mondays and to accommodate studio arrangements. Beginning with Program 6, the Television Modules were produced in the OECA studio. The Module scripts were completed by Friday and feedback information was added on Monday. Art work and graphic displays were prepared by the OECA Art Department and by Peel-Craft Productions.

The Director complained of the late date at which he received the Module script. No solution was found to this problem since the Newsletter and script were written simultaneously following the previous program.

MAKING NEWS

The project poster designed by Reason, Dimson and Smith Limited was reduced to provide the cover for the Newsletters. Each of the nine issues printed had a different coloured cover.

Newsletter 1 for programs 1 and 2 was mailed on March 2 to allow sufficient time for preparation of the first experiments. Subsequent newsletters were written and prepared by Mike Comstock and Judy Winestone between Wednesdays and the following Tuesdays. After editing for science content by Dave Chamberlain, and for English syntax by Philip Nixon, final copy was delivered to the OECA printer on Tuesday evenings. The Newsletters were printed, collated and mailed on Thursdays and Fridays so that teachers received them before the corresponding television program.

Approximately 2200 newsletters of each issue were printed by the OECA printer with an additional 1000 printed by Islington Press. The additional 1000 were required partly to meet the requests of students for individual copies, but mainly for teachers requesting enrollment after the deadline. Such requests were arriving as late as April 27, half-way through the series, but because of alleged limitations in the capacities of the telephone system and of the OECA Printing Department, it had been

decided to send the late-comers a letter inviting them to participate in the feed-back system when a similar project was offered at a later date. However, as a token of good will, the late-enrolled classes also received Newsletters distributed by the Islington Press.

The Newsletter format varied from week to week, but usually included the following:

TO THE TEACHER: A letter to teachers describing procedures, offering teaching suggestings and informing classes of changes due to holidays.

SPECIAL NEWS FOR SCIENCE LAB STUDENTS: Explanations of issues raised in the television programs. For example, the true derivation of the umbrella was described.

FEED BACK: Reports of mail-interaction experiments with some schools given special mention. An attempt was made to mention different schools each week. This section also included explanations of problems that might be encountered while performing experiments, provincial maps giving weather measurements, and summary explanations.

EXPERIMENTS AND EQUIPMENT: Descriptions of experiments with directions for students to telephone or mail results.

RELATED ACTIVITIES: Descriptions of further experiments and activities related to subjects such as social studies and creative writing.

QUESTIONS AND ANSWERS: Answers to science questions mailed and telephone by interested students.

ON THE AIR

At last the day came--March 28, 1973--when the first of the ten programs was broadcast. From then until May 30 *Ontario: Our Science Lab* was broadcast on Wednesday mornings at the following times:

CICA Channel 19	9:15 and 11:00
CBC Provincial Network	9:15
CHCH Channel 11, Hamilton	11:00
CJOH Ottawa CTV	11:00

Although the majority of classes watched the series on Wednesdays, in some schools the programs were videotaped and shown at more convenient times later in the week.

As to the content of the programs, this is how they were described in the first newsletter:

1. *The Ups and Downs of Water* -- an illustration of the water cycle as it affects all forms of life in Ontario, starting with the human body. (March 28)

2. *The Magdeburg Experiment* -- A study of atmospheric pressure, including an experiment in 1672 when two horses tried to pull apart two halves of a sphere which were held together solidly by a vacuum. (April 4)

3. *Haboobs, Mistrals, Chinooks and All That* -- The effects of gentle and violent atmospheric motion. (April 11)

4. *Air Antics* -- How air movement varies from place to place and what happens when air fronts collide. (April 18)

5. *Your Money or Your Life* -- Each year, around the world, tornadoes, hurricanes and forest fires destroy homes and claim many lives. Who gets the most snow in Ontario? If you were lost in the winter deep in the woods would you know how to survive? (April 25)

6. *When You're Hot You're Hot* -- How hot is a hot day? How much hotter is a hot bath? This program offers some temperature surprises. (May 2)

7. *Brain vs. Brawn* -- All life must cope with the weather. Some animals cope well; others poorly. How do we prepare to meet changing weather? (May 9)

8. *Weatherwise . . .Otherwise* -- An exploration of the myths and realities of weather. (May 16)

9. *Making an Impression* -- Man's influence on his environment and the problems that result. (May 23)

10. *Feeling Blue* -- Does weather affect the way we feel? (May 30)

As seems inevitable in broadcasting, there were problems. On March 8, it was learned through a telephone call from a regional council member that CBC Ottawa would not be broadcasting *Our Science Lab*. Arrangements were made with the Ottawa CTV station CJOH to show the programs; but on March 28, CJOH did not broadcast Program 1. Telephone calls from principals in the area complained about the inconvenience, which resulted from a failure to pick up the feed from CBC. Arrangements were made to broadcast the program on Thursday, March 29 at 11:00 a.m. On April 4, CJOH did not broadcast the first seven minutes of Program 2. Again principals telephoned to report the problem. Program 2 was re-scheduled and shown on Thursday, April 5 at 11:00 a.m.

On April 11, a microwave failure at CHOV Pembroke resulted in Program 3 not being shown in that area. School teachers telephoned about the breakdown. The program was re-scheduled and shown in the Pembroke area on Wednesday, April 18 at 7:40 a.m. All schools affected by these problems were informed of the changes. Teacher comments included:

"No problem: will watch tomorrow,"

"95 children assembled: chaos!" and

"Your phone calls make us feel you care. Thank you for the personal interest you have shown."

THE NERVE CENTRE

By the time of the first broadcast, a sizable part of OECA's headquarters had been commandeered for the Information Bank. It was staffed by twelve people including Information Bank Co-ordinator Judy Winestone

Research and Planning Assistant Karen Seabrook, five telephone-operators-cum-information-handlers, two clerk-typists, and the Television Module production team. The Television Core staff and others involved operated from their regular offices.

After consultations with Bell Canada, six call-directors were installed with ten INWATS and six local telephone lines to receive data calls, during which students reported their experimental results and observations at designated times. Schools outside the local call area could telephone without charge to the INWATS numbers apart from those in the Ministry of Education Region 1 which were invited to call collect.

Early in March instructions for telephone procedures were mailed to each school together with a weather pamphlet and a cloud chart provided by the Department of the Environment. Because of the large volume of calls expected, schools were asked to select a student monitor to report information on class experiments. It was suggested that in schools were there was more than one monitor, the monitors meet and form a single report to be called in for the schools.

Data calls were scheduled for Fridays and Mondays to allow the students sufficient time to build equipment and perform the experiments from the Wednesday television program.

Every telephone call was recorded on an information card. Weather readings from data call cards completed on Fridays and Mondays were averaged for each town. Two to three Ontario maps, according to the number of weather readings requested, were displayed on a nearby bulletin board. The student readings were marked on the maps to create a provincial weather picture. These maps were then compared with government maps received from the Department of the Environment and the results were available for the Newsletter on Tuesday.

Telephone inquiries were accepted on Tuesdays, Wednesdays and Thursdays. Fact books were compiled for telephone operators so that they had the necessary information to answer queries concerned with broadcast difficulties and experiment procedure problems as well as some science questions, most of

which were answered by educators Mike Comstock and Dave Chamberlain. Sometimes schools had to call back at a pre-arranged time for the answers. Often the responses were recorded by the teacher and played to the rest of his class, and sometimes rebroadcast over the school's public address system.

The students asked so many intelligent questions that *Science Lab* decided to invite subject experts to answer some of these queries. This "Call the Experts" project involved specialists (who will be named later) on bird migration, recycling of wastes, and airplanes. During the all-to-brief periods when the experts were available the telephones were busy 100 per cent of the time.

A bilingual operator was on hand to answer calls from French-speaking students and to translate experiment reports written in French.

Each Newsletter included descriptions of at least two experiments to be reported by mail. Not all classes were able to complete all of the experiments, choosing only those that appealed to them. Nonetheless the response by mail far exceeded initial expectations. Some classes mailed reports from each student, though others sent one report for the class. In addition to experiment reports, *Science Lab* received various posters, charts, drawings, paintings, photographs, slides, audio and video tapes and films. Exceptional reports and other offerings were chosen for display in the Television Modules or specially mentioned in the Newsletters.

Teachers and students also used the postal services to request answers to questions raised on the Television Programs, to request additional Newsletters and weather kits, and to offer suggestions and criticisms.

Thank-you letters were sent to students who mailed experiment results to *Science Lab* before the first week of operation. At the end of the project, thank-you cards were sent to all enrolled classes, classes not enrolled but which sent information, and all persons who in some way contributed to the success of *Science Lab*. These cards bore the signature of Dr. D. L. C. Miller, General Manager, Educational Media Division.

THE INSIDE STORY

Only by listing all the branches of OECA which were eagerly involved in the *Science Lab* project can its complexity be conveyed.

Administrative Services, under the direction of Bert Pilcher, provided the project headquarters, made initial contact with Bell Canada and ensured prompt mail delivery. Information cards, thank-you cards, questionnaires and the weekly newsletters to enrolled classes were printed by Stan Bushell. The collation and distribution of newsletters was directed by Joe Baldwin.

Utilization: contacts with outside educational organizations were facilitated by Al Fasan and Ruth Vernon. A colour videotape of *Science Lab* Program 1 with accompanying posters and newsletters was shown to a group of teachers of Lakeshore Teachers College and to a group of 40 teachers of the Wentworth Board of Education. Comments about the project made at these meetings were relayed to the *Science Lab* staff.

Publications: The design, printing and mailing of the *Science Lab* poster were handled by Carol Madani. The design for the newsletter cover was also arranged through the poster designer.

Information Services promoted the project through written articles and contact with the press. David Livingstone wrote an article on *Science Lab* which appeared in the March issue of the *Channel 19 Program Guide*. Carol Conlin made information, such as the names of enrolled schools, available to the press. Journalists from the *Toronto Star* and the *Scarborough Mirror* and a freelance writer met with the project team to discuss *Science Lab*. Marg Gayfer, editor of *School Progress*, visited OECA to collect information for an article entitled "Dear Science Lab: Do Birds Sweat?" Altogether about 40 different newspapers carried stories on the project.

Purchasing: Tubes for *Science Lab* posters were ordered with the help of Mike Brosky. The arrangements with Islington Press for the printing of extra newsletters were also made through the Purchasing Department.

Traffic: When broadcast failures occurred in Ottawa and Pembroke, Monty Fotheringham was helpful in suggesting alternate approaches. Chris Acton worked on arranging re-scheduled broadcast times.

The Art Department worked in close collaboration with *Science Lab* throughout the project. The Television Module set design was done by Chris Adeney. John Randle prepared art work each week for the Television Module and the Newsletters.

Media Resource Centre: Gordon MacLean was most helpful in supplying resource materials related to *Science Lab*. The Centre's rotary file was used for storing information cards.

OECA Regional Councils: Posters were mailed to the 75 members of the OECA Regional Councils with an enclosed letter from Elwy Yost asking them to promote the project.

Teacher Education: members of the Educational Media Division filmed activities at *Science Lab* headquarters and student reactions to *Science Lab* at Rawlinson Junior School for a segment of an OECA promotional program shown to officials of the Ontario Government.

Research and Planning: Dr. Kawashima, in collaboration with Larry Gerner, undertook the analysis of data from a questionnaire survey initially administered by Karen Seabrook. I acted as statistical consultant, and Ignacy Waniewicz advised on various aspects of the project.

OUTSIDE HELP

Several educational organizations in the province were informed of the *Science Lab* project in order to promote its integration with existing educational facilities. The list of organizations which gave support is impressive.

Ministry of Education: Posters were sent to all Science, Junior Education and Learning Materials Consultants of the Ministry of Education. The Learning Materials Consultants also received weather kits, telephone procedures, lists of enrolled schools and the weekly Newsletters. On January 23, the concept of *Science Lab* was presented to them at a

meeting in Sudbury, and they then helped to promote it to schools.

Boards of Education: Three science co-ordinators from boards of education in Metropolitan Toronto telephoned to inquire about the series. They were sent Newsletters and lists of enrolled schools in their areas. G. Jarrell, audio-visual co-ordinator for the Scarborough Board of Education visited *Science Lab* on April 13. He regretted that he had not been informed earlier of the project, but was interested and visited classrooms in Scarborough which were participating.

Ontario Science Centre: On January 17, members of the project team met with Tiazo Miake and education officers of the Ontario Science Centre. This led to Lori Foundtain of the Science Centre's weather station developing a program on *Science Lab* topics which was presented on request to enrolled classes visiting the Centre. Phil Gebhardt organized an exchange of *Science Lab* ideas between four enrolled schools via the Centre's ham radio station. The schools were: Stanley Road Public School, Downsview; Keys Public School, Deep River; G. L. Armstrong School, Hamilton; and St. Mary's Separate School, Thunder Bay.

Ontario Institute for Studies in Education: After a meeting with Dr. Weiss project descriptions, posters and newsletters were sent to OISE's eight regional centre so that they, in conjunction with the Ministry of Education, could encourage meetings of teachers involved in the project.

Environment Canada,Etc.: George Pincock, Director of the Ontario Region of Atmospheric Environment Services, provided 1000 copies of weather pamphlets and cloud charts. *Science Lab* had a large number of requests from teachers and students for additional weather kits, so 2000 more copies were obtained from Mr. Thomas of the Department of Transport at Toronto International Airport and these were mailed to schools on request. Mike Newark, a meteorologist for Environment Canada and writer of the Core scripts, also acted as a consultant to the Core Educational Supervisor and to the Newsletter Editor. He provided government weather maps on related weather phenomena during the first five weeks of the project.

Metropolitan Toronto Libraries: With the help of Laura Murray, audio-visual co-ordinator, *Science Lab* posters were distributed to approximately seventy public libraries in Metropolitan Toronto.

Bell Canada: On February 1, J. S. McNeice, General Supervisor of Public Relations at Bell Canada, met with the project team. He suggested that Bell Canada provide films and speakers to educate involved students on telephone usage. On March 16, Mr. McNeice sent a memo to all District Managers in Ontario asking for their assistance in informing Regional Directors about the project and enclosing lists of enrolled schools

University of Toronto: A resource list of books related to the subject content of the *Science Lab* series was prepared by a graduate student of the Faculty of Library Science. Several of these books were mentioned in the Newsletters.

Royal Ontario Museum: Ross Harrison, ornithologist at the ROM, assisted the Newsletter Editor with the Bird Migration Experiment and answered inquiries on birds on Call the Experts on May 10.

Canadian Armed Forces: Captain Brown of the Downsview Air Force Base assisted the Core production staff with the sequence on survival, and was very helpful in answering questions. He suggested that Captain Bill Martel, who served with the Canadian Air Force, be enlisted for Call the Experts. On May 25 Captain Martel and Adam Saunders, a pilot of private planes, answer student calls on aviation.

Pollution Probe and Pollution Solution: Three members of the Pollution Probe and Pollution Solution were available on May 24 for Call the Experts. In addition to answering student questions on recycling of wastes, they provided a list of resource books which was printed in Newsletter 8.

Ontario Forestry Association: Through the Department of Lands, Forests and Parks, *Science Lab* learned of the Forestry Association. Steve Williams was interested in the *Science Lab* hunt for the largest tree in the province and asked in a Television Module interview that

students continue their search in the summer and send reports to him. The Association also sent records, films and pamphlets to *Science Lab*.

Ontario Department of Tourism and Publications: Mr. Brown was very helpful in providing brochures to assist students in their rock hunt during the summer. Twenty-five hundred brochures of *Discover Ontario* and *Mining in Ontario* were obtained and mailed to classes with Newsletter 9.

BEYOND THE PALE

Finally, let us spare a thought for those with whom OECA was debarred as a Provincial Authority, from co-operating.

A school from Livonia, Michigan mailed an enrollment form to *Science Lab* before the deadline date. A letter was sent to the teacher explaining that in this pilot project the support materials were not available outside Ontario.

Later, the audio-visual director of the Board of Education in Niagara Falls, New York, visited *Science Lab* requesting copies of Newsletters. Several schools in the area were enjoying the programs and wanted Newsletters to facilitate performing the experiments.

Perhaps an agreement could be made in future to allow the participation of American schools.

USING THE SYSTEM

There were no fewer than 66 experiments and related activities suggested within the Television Modules and Newsletters. Here are the instructions for one of the more elaborate experiments, reproduced exactly as they were set out in Newsletter 1.

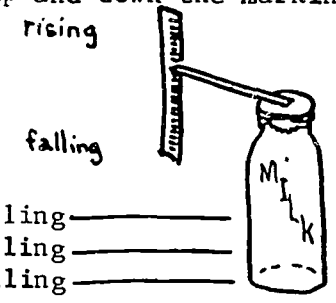
ONTARIO AS A LAB

Barometer

Stretch the balloon over the bottle opening and secure it with glue and wire. Carefully glue the straw from the center of the balloon membrane and flatten the end to serve as a pointer. Station the ruler so the end of the pointer will move up and down the markings.

Equipment

Glass bottle
Balloon
Thin wire
Plastic straw
Ruler
Glue



Steady, Rising, Falling
Steady, Rising, Falling
Steady, Rising, Falling

Experiment 5

Record the pressure
Wednesday April 4th 2:30 p.m.
Thursday April 5th 2:30 p.m.
Friday April 6th 10:00 a.m.

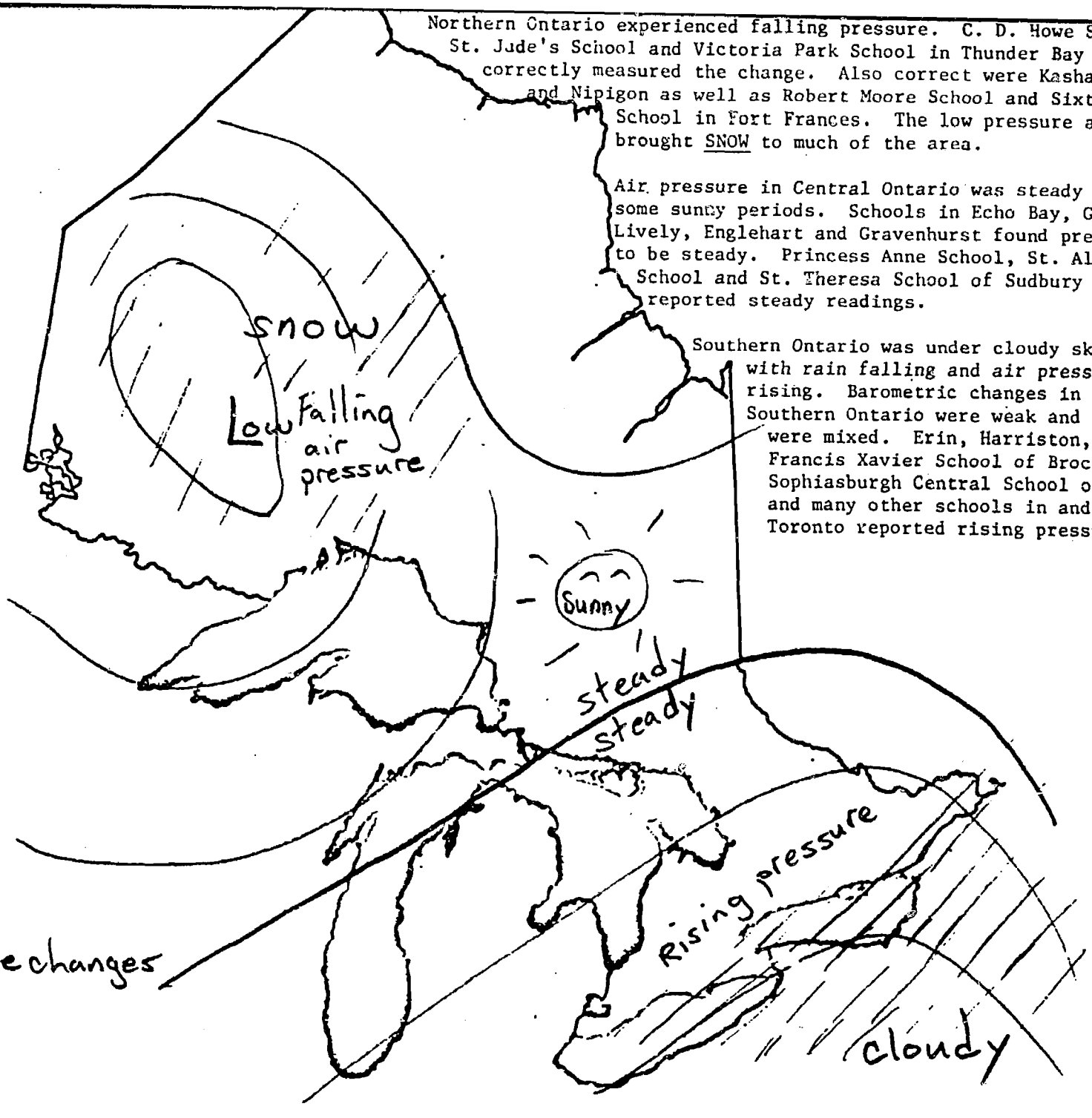
CHECK YOUR MAP FOR TIME TO PHONE RESULTS TO SCIENCE LAB

And here is part of the feedback of results reproduced from Newsletter 3.

Northern Ontario experienced falling pressure. C. D. Howe School, St. Jude's School and Victoria Park School in Thunder Bay all correctly measured the change. Also correct were Kashabowie, and Nipigon as well as Robert Moore School and Sixth Street School in Fort Frances. The low pressure area brought SNOW to much of the area.

Air pressure in Central Ontario was steady with some sunny periods. Schools in Echo Bay, Garson, Lively, Englehart and Gravenhurst found pressure to be steady. Princess Anne School, St. Aloysius School and St. Theresa School of Sudbury also reported steady readings.

Southern Ontario was under cloudy skies with rain falling and air pressure rising. Barometric changes in Southern Ontario were weak and reports were mixed. Erin, Harriston, St. Francis Xavier School of Brockville, Sophiasburgh Central School of Picton and many other schools in and around Toronto reported rising pressure.



A. Air pressure changes
April 5th

Several other experiments used the entire province as a laboratory, such as this one for which the Newsletter's instructions began:

> In Program 7. . . we plan to conduct an Ontario Migration Watch in which a frequency count of birds at a feeder will show the spring migrations into Ontario. This will be the largest bird watching activity ever performed in Ontario.

Like other experiments, this one was generally successful but individual teachers found difficulties. We can sympathize with the teacher of the physically handicapped who wrote: "Our building is in downtown Windsor; consequently our wild bird count at present is 1 sparrow."

Music and Verse

In addition to the main experiments for which feedback of results was requested, there were related experiments and activities, such as this one. "To make a musical straw, clip the end of a straw to a point. Flatten the point and blow! Cutting the straw to various lengths will change the tone." It drew this comment in a letter from Marty Ann Noble, Grade 6, of Guelph. "When I tried the musical straws I was surprised because they made such a funny noise. All of the experiments I did were fun to find out what was going to happen."

The experiments called for a minimum of apparatus and that which was required could be simply made from easily available odds and ends. This inspired Robin Arenburg to write:

> Our Science Lab was on T.V.
> How silly did it seem to me
> When measuring the weather
> With only a feather
> Observations and results we did see.

Wasted Waste

Some experiments had serious social implications. Witness the Newsletter feedback on the Pollution Consciousness experiment:

> Some students loved looking through trash, but many didn't like it. Science isn't always clean and neat. (Some scientists study just animal waste or digested foods.) The point was to see how much of your garbage was not necessary. The average amount of unnecessary trash was almost one half of each can.

One way to observe this problem is to provide four trash cans for each one you now have. People put metal items in one can; glass in another; paper in a third can and wet garbage and food in the fourth. Paper and glass can be re-used by the people who make them. Metal can be sold for scrap to be used in making more metal. Wet staff can be piled up and turned into fertilizer.

Maybe there is an anti-pollution group in your town that can tell you more about re-cycling wasted things.

The lesson was summed up by fifth grader Charlene Bridgewater of Simcoe who sent in this poem:

Canada is a beautiful place,
So if you want to live in it
You'll have to pick up garbage and grit.
Pollution I don't like one bit,
But Canada I do
Help fight pollution,
And make Canada like new.

Top of the Pops

The three most popular experiments were, in order:

1. A study of air currents and aerodynamic stability using paper airplanes of different types but all so simple to make that every student could participate.

2. Listing things you would need to have in a survival kit such as many woodsmen and explorers carry. The kit had to be no larger than a knapsack and weigh no more than three pounds.

3. A search--which continued through the summer--for the largest tree in Ontario as measured by its circumference four feet from the ground.

All His Own Work

Students even devised their own experiments. This one by David Irvine of Sarnia, was written up in the five steps suggested by *Science Lab* for the reporting of all experiments. David wrote:

My experiment is on anchoring dykes offshore. The purpose is to stop flooding on Lake St. Clair. I feel we should put dykes up onshore and anchor them offshore.

1. Theory: That offshore dykes would stop erosion.

2. Materials: Watertight container, mud, rocks, ruler (to act as a dyke), block (to represent a house).

3. Method: First I put dirt in one end of the container. Next I filled it with enough water not to cover the dirt. Next I put the block down on the dirt. Then I made waves. Next I made an onshore dyke. Then kept moving it farther out.

4. Observation: The farther out I moved the dyke the more waves knocked over the house.

5. Conclusion: Onshore dykes are best.

FEEDBACK SETBACK

The amount of feedback from schools was less than anticipated. During the nine weeks in which schools were asked to send in their findings on 21 principal experiments and activities, a total of 3,278 sets of reports were received by mail and telephone. This means, however, that an average of only 156 schools out of the 967 enrolled reported on each activity. To put it another way, about 250 packets arrived each week--an unexpectedly large quantity--but data calls also averaged about 250 a week, whereas a number near 967 had been hoped for. The following table summarizes telephone usage:

Type of service	Local	Zone 1 INWATS	Zone 2 INWATS
Number of lines	6 lines	4 lines	6 lines
Average calls per busy hour	16.0 calls	4.4 calls	14.8 calls
Average usage per busy hour	38.0 mins.	12.7 mins.	47.3 mins.
Average length of call	2.3 mins.	2.9 mins.	3.2 mins.

It can be calculated from those figures that to provide a 5 per cent

grade of service, such that no more than one call in twenty receives a busy signal, only half the actual number of lines installed for each type of service were really needed.

To find out why the telephone system was being used so little, non-using teachers were called via government lines during the first two weeks. The majority reported that they had not received notice of the telephone procedures. Others said that the television time was not suitable or that they had not been able to telephone previously but would do so in future. A second set of telephone procedures were mailed with Newsletter 5, and data calls increased temporarily.

The real trouble probably lay in the fact that Bell Canada had requested reporting times be staggered to avoid the danger of jamming the lines. The call-in procedures were further complicated by the request that, to save the taxpayer's money, only one call per school be made each week, so that up to 12 classes were expected to combine their data. These restrictions intimidated the teachers, who excused themselves with such reasons as "we missed the phone-in time and were afraid to call at another time," and "we thought you would be besieged by calls." Another factor which restricted usage was teachers' lack of experience in this type of interaction, many claiming that "the students were afraid to phone all the way to Toronto."

Lack of feedback was no indication that classes were failing to carry out experiments. From interviews with teachers it was learned that many classes were performing the majority of suggested activities but were not taking the time to report back to *Science Lab*. Thus an easy experiment in measuring wind speed (with an anemometer made out of a ping-pong ball attached by a string to a protractor) elicited data calls from 379 schools, whereas the much more popular Survival Kit activity elicited reports from only 29 schools.

Incidentally, *Science Lab* received 321 sets of reports on activites for which no feedback was requested, and 194 inquiry calls were logged.

DEAR SCIENCE LAB: PLEASE . . .

The questions posed by students were wonderfully various. For example: How do clouds stay in the air with tons of water in them? At what height would people start to freeze? How much power is utilized in producing lightening? Do tires go flat faster when you ride fast or slow? How are altimeters developed and used? Is there salt in rain? How do you find out how to do your experiments?

There were many requests for resource materials, such as this one from a grade 4 and 5 class in Sault Ste. Marie: "Are whole class of 26 enjoys the Cloud Chart so much that we were wondering if you could send each of us one. We would apresheate it very much." *Science Lab* was equally delighted to meet the request. The staff also did their best to satisfy individuals such as Susan who wrote: "I surely know that you get a lot of letters concerning weather but I promise I wouldn't tell any of my friends the address. . .Do you really think you'd mind if I could have some information? Because my friend has so much information on weather and I hardly have any. Would you please send me a cloud chart if possible 2. Weather instraments pictures of weather Hurricanes, Clouds, Air, currents measure paper of rainfalls and if possible a lot more. I watch your shows lots of times. . .Thank you very much."

Several students and teachers asked to visit *Science Lab* and were given a complete tour of CECA.

THE BEST THING

During each of the last seven programs, research assistant Karen Seabrook visited a different elementary school in the Toronto area to make observations. In one of the schools three teachers were participating actively. In the corridor she found the *Science Lab* poster was the centre of a large coloured display describing and picturing barometers, anemometers, wind vanes, paper airplanes and plant experiments. These are Karen's notes on a viewing of Program 8 by a class of 32 students in grades 4 and 5:

The students were seated on the floor of the library for the Television Program in black and white. They were very attentive during the Module section, waiting anxiously for their class to be mentioned.

This class has performed many of the *Science Lab* experiments, and telephoned and mailed their results. Anemometers, barometers and bird pictures are on display in the classroom.

The students are enjoying the programs and especially liked the paper airplane experiment. The teacher said that they tried to do too many of the experiments in too short a space of time.

The problem with a large class, she said is organizing the experiments to give each student something to do.

The teacher said this is the best thing done in educational television and she is looking forward to participating next year.

Not So Sure

In contrast, consider this report on a viewing of an earlier program by 37 grade 5 and 6 students whose teacher admitted that she felt rather insecure about the more scientific activities:

The class was seated at tables to watch the program in black and white. Attention appeared quite high during the program and the children laughed freely at the cartoon sequences. Only towards the end of the program did the students become slightly restless.

The teacher questioned the students on what they had learned from the broadcast. They seemed to have readily grasped the concepts that hot air rises and that air carries sound. The experiment with the candle and the plastic bag, showing hot air rising, was most popular. New vocabulary words "stable" and "unstable" were emphasized by the teacher.

When asked what they liked and disliked about the program, the students were eager to offer their opinions. They referred to several specific incidents from the program. The cartoons were favoured by all because they were funny. The experiments were also enjoyed because they "show things" and "it's better than just saying them."

The major criticism was that they couldn't understand some

of the experiments like the hot air factory and some of the weather feedback information.

This class has not mailed or telephoned any results to *Science Lab*. Some of the easier activities, however, are being attempted. A bird blind was built in the school yard and a count of visiting birds is being recorded. In the classroom a large poster shows that one bird of an unknown variety was seen.

The newsletter description of paper airplanes is on display and a paper airplane contest is underway. The *Science Lab* poster is posted on one of the classroom windows.

The class has watched the four *Science Lab* programs to date.

Classroom observations and letters from teachers and students alike show that the more work anyone put into *Science Lab* activities the more everyone around enjoyed the learning system as a whole. This was exemplified by a teacher sho telephoned from a Weston public school to say:

> Best thing you've ever done. Most educational shows are junk - not yours. Six children started the project. When the rest saw it, they became interested. Now we have 115 children all madly enthusiastic.

STATISTICAL EVALUATION

Because of the magnitude of the *Science Lab* project, it was decided, in April, 1973, that its effectiveness could be evaluated economically only by a specially designed mail-questionnaire survey. It was hoped that the survey would answer the following three basic questions:

1. To what degree were participating classroom audiences involved with the various *Science Lab* components?
2. To what extent did the learning system encourage interaction among classroom audiences themselves and between the audiences and project personnel?
3. What were the determining factors of increased involvement and interaction, if any, among the classroom audiences?

PROCEDURES

The Sample

This survey is limited to the classroom audiences who had enrolled to participate in the learning system by the registration deadline, February 22, 1973. A 20% sample of 362 teachers was drawn at random from the list of the officially enrolled teachers. All were asked to complete a Teacher Questionnaire, which was mailed when the broadcasts ended in May. After a later reminder to non-respondents, 71% (i.e. 258 teachers) returned the Teacher Questionnaire. Of these 258 teachers, the responses of 17 were excluded from the present analysis, either because they did not participate at all in the learning system, or because their questionnaires were too incomplete.

Of the 362 teachers in the original sample, 91 were selected at random and asked to collect data from their approximately 3200 students. Each of these teachers was therefore given 12 copies of three different Student Questionnaires to distribute randomly. Of the selected teachers 63% forwarded returns from 1,858 students. Of all these students, the data of only seven

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[1] Based upon Statistical Evaluation of Ontario: Our Science Lab (OECA, 1973) prepared by Junichi Kawashima, Ph.D.

had to be excluded from this analysis because their responses were incomplete. Thus, the present analysis is based on data collected from 241 teachers and 1,851 students.

The Questionnaires

As can be seen from the complete listing of questions given in Appendix A, the Teacher Questionnaire covered the following topics:

1. degree of audience participation and involvement in *Science Lab* (questions 1 through 10);
2. extent of interaction among classroom audiences (questions 11 through 13);
3. student and teacher reaction to the project (questions 14 through 20);
4. teacher interest in future participatory projects (questions 21 through 25);
5. personal data (summarized later in Table 2).

To reduce the time and energy required for the data collection, the Student Questionnaire was split into three parts which were distributed randomly to students who had viewed most of the *Science Lab* television programs. As can be seen from the complete listing of questions given in Appendix B, the three groups of responding students dealt with the following topics:

Group A: Best liked *Science Lab* television programs, and degree of liking of the project.

Group B: Experiments or activities done on their own out of school.

Group C: Best liked *Science Lab* experiments or activities.

The success of the randomization procedure is shown by the similar demographic characteristics of all three groups, as summarized in Table 1. Because of the similarity of the respondents, the three questionnaires can be considered as one.

Table 1. Profiles of Student Sample.

Variable	Group A (N=636)	Group B (N=615)	Group C (N=600)	All (N=1,851)
Sex				
boy	48.4%	52.5%	48.2%	49.7%
girl	51.2	46.5	51.8	49.9
Grade				
3 and 4	35.5%	28.8%	33.5%	32.6%
5	30.5	37.7	31.2	33.1
6 and 7	34.0	33.5	35.3	34.2
Locality				
Rural	20.4%	19.8%	20.8%	20.3%
Town	25.6	28.4	27.5	27.2
City	53.9	51.7	51.7	52.5

RESULTS

In an attempt to explore the determinants of involvement and interaction, the responding teachers were divided into two groups on the basis of the total number of their television viewings, telephone calls, mail contacts and classroom experiments. The minimum possible score was 1 (it will be remembered that those with a zero scores were excluded from analysis). The 119 teachers who scored 16 or more will be referred to as the "more active" group, and the 122 who scored 15 or less as the "less active" group.

Differences between the two groups will be considered in detail later. For the moment it is sufficient to remark on a similarity. Table 2 shows that in both more and less active groups, 40% were teachers of mathematics or science, as would be expected, considering the subject matter of *Ontario: Our Science Lab*. Because many such teachers are men,

it is hardly surprising that the proportion of males in the sample was 18% greater than in the population of elementary school teachers in Ontario. Thus there is no evidence so far to show whether a feedback learning system appeals more to men or women teachers, though there was a non-significant tendency for boys to claim liking *Science Lab* more than girls.

Table 2. Profiles of Teacher Sample.

Variable	More Active (N=119)	Less Active (N=122)	All (N=241)
Most Favoured Teaching Area			
Mathematics	26.1%	23.8%	24.9%
Social Studies	21.0	9.0	14.9
Science	13.5	16.4	14.9
Language Arts	16.0	18.0	17.0
Other Areas	7.6	13.9	10.8
Sex			
Male	46.2%	47.5%	46.9%
Female	53.8	48.4	51.0
Average Years of Teaching	8.4 YRS.	7.2 YRS	7.7 YRS.
Grade Taught			
3 and 4	29.4%	35.2%	32.4%
5	41.2	31.1	36.1
6 and 7	27.7	26.2	27.0
other	1.7	7.4	4.5
Locality			
Rural	23.5%	13.1%	18.3%
Town	26.9	26.2	26.6
City	49.6	60.7	53.9

Degree of Involvement

"To what degree were participating classroom audiences involved with the various *Science Lab* components?"

It is quite impressive that, according to the teachers' responses summarized in Table 3, participating audiences watched most of the television programs broadcast and performed slightly more than the two classroom experiments expected by the designers of the learning system. On the other hand, the frequency of telephone calls and mail contacts was somewhat lower than expected, probably because of the restrictions imposed by OECA on telephone and mail contacts, and also because of the extra time and energy required for such activities.

Table 3. Mean Frequency of Television Viewings, Telephone Calls, Mail Contacts, and Classroom Experiments.

	More Active	Less Active	All
Television Viewings	9.5	7.5	8.5
	($t = 7.14$; $P < .001$)		
Telephone Calls	4.8	0.4	2.6
	($t = 16.19$; $P < .001$)		
Mail Contacts	5.3	0.5	2.9
	($t = 17.17$; $P < .001$)		
Classroom Experiments	3.0	1.7	2.3
	($t = 8.74$; $P < .001$)		

The big differences between the more and less active groups did not lie in the amount of television viewing and classroom experimentation but in the degree to which they provided feedback. It is apparent from Table 3 that nearly all telephone calls and mail contacts originated from the more active group. This finding is supported by the fact that 50% of the less active group admitted that they sent in no reports of experimental results. In addition, it appears that the more active group performed more related activities (such as painting, writing, and taking photographs) than the less active group. (See Table 4.)

Table 4. Proportion of Teachers Reporting Favourite Feedback and Methods, Related Activities Performed, and Degree and Extent of Classroom Participation.

	More Active (N=119)	Less Active (N=122)	All (N=241)
Effective Feedback Method*			
Telephone	21.0%	7.4%	14.1%
Newsletter	21.0	25.4	23.2
Television Module	68.9	54.9	61.8
None of the Above	6.7	18.0	12.5
Reporting Preference			
Telephone	35.3%	12.3%	23.7%
Mail	33.6	16.4	24.9
No Preference	26.9	13.1	19.9
No Reporting	2.5	50.0	26.6
Related Science Lab Activities*			
Paintings & Drawings	77.3%	53.3%	65.2%
Writings	72.3	51.6	61.8
Taking Pictures	19.3	6.6	12.9
Others	36.1	21.3	28.7
Degree of Curriculum Involvement			
0 - 25%	69.8%	89.3%	79.7%
26 - 100%	30.2	9.9	19.9
Participation as desired*			
Yes	41.2%	15.6%	28.2%
No - other projects	31.9	44.3	38.2
No - timetable conflict	12.6	34.4	23.7
No - other reasons	23.5	32.0	27.8

*The percentages add to more than 100% due to multiple responses.

About 80% of the teachers sampled indicated that they devoted less than a quarter of the total classroom curriculum to *Science Lab* activities during the 10-week period. However, some 31% of the more active spent more than a quarter of the time available on the project, though only 10% of the less active did so. (See Table 4.)

All in all, it seems that the present sample of teachers and their classes were involved with *Science Lab* as much as their local conditions permitted. As shown in Table 4, 41% of the more active group indicated that their classes participated in the *Science Lab* project to the extent they would have liked, while only 16% of the less active group did so. The two main reasons for less participation among both groups were: (1) involvement in other projects, and (2) timetable conflict. The timetable problem was raised by 34% of the less active group as compared to 13% of the more active group. It therefore seems important to resolve these problems through such measures as repeating broadcasts of television programs, and broadcasting "Core" programs further apart to allow time for other projects.

The Extent of Interaction

"To what extent did the *Science Lab* learning system encourage interaction among classroom audiences themselves and between the audiences and project personnel?"

About 70% of the teachers indicated that they found the nature of *Science Lab* activities encouraged students to work together more frequently during the 10 weeks than previously. Furthermore, 57% of the teachers reported that they themselves exchanged teaching ideas, apparatus and resource materials with other teachers during *Science Lab* more frequently than before. (See Table 5.)

Table 5. Proportion of Teachers Reporting Increased Group Work and Exchanges of Ideas, Apparatus and Resource Materials.

	More Active (N=119)	Less Active (N=122)	All (N=241)
Increased Group Work			
Yes	79.0%	60.7%	69.7%
Other	21.0	39.3	30.3
	($x^2 = 9.51$; $P < .01$)		
Increased Exchanges			
Yes	49.6%	32.8%	41.1%
No	50.4	67.2	58.9
	($x^2 = 7.67$; $P < .01$)		

In addition, three quarters of the teachers indicated that their classes reported results of experiments or activities by telephone or mail or both at least once during the 10-week period.

The more that teachers were involved with *Science Lab*, the more both they and their students interacted with their peers. Eight out of ten of the more active teachers' group found that *Science Lab* encouraged their students to do more group work: and half of the more active group exchanged teaching ideas, apparatus and resource materials with other teachers more frequently during the 10-week period. The proportions of less active teachers who exchanged ideas and whose students did more group work were significantly less, as Table 5 shows.

Table 6. Proportion of Teachers Reporting Other Interactive Activities.

	More Active (N=119)	Less Active (N=122)	All (N=241)
Telephone Feedback Used	91.6%	25.4%	58.1%
Mail Feedback Used	95.8%	23.8%	59.3%
Increased Use of Resource Books	50.4%	45.9%	48.1%

Nearly half of the teacher sample indicated that their students used science resource books available in school and public libraries more frequently during the 10-week period than before. Despite the much greater interaction demonstrated by the more active group, their students made little extra use of resource books as compared with students of the less active group (Table 6). This suggests that *Ontario: Our Science Lab* encouraged the more frequent use of science books independently of teachers' demands and behaviours.

These results show that in the opinion of even the less interested teachers, *Science Lab* increased interaction among classroom audiences as well as between the audiences and project personnel to an extent that would not otherwise have occurred.

Factors Affecting Involvement and Interaction

"What were the determining factors of increased involvement and interaction among classroom audiences?"

Three differences between the more and less active groups are apparent from Table 2. Firstly, in rural schools more active teachers outnumbered the less active almost two to one, whereas in urban schools there was a slight tendency for the less active to preponderate, possibly there were fewer alternative activities available for students in the country. Secondly, teachers in the lower grades tended to be less active, perhaps because they felt the experiments to be too difficult for their students. Thirdly, teachers of social studies were proportionately more active than teachers of other subjects, perhaps because they are the most interested in innovative communication techniques.

Furthermore the degree of involvement is directly related to the extent of interaction. Significant positive correlations were found among all the major measures and indicators of involvement and interaction, as can be seen from Table 7. For example, those teachers who watched more television programs were more likely to have found increased group work ($r=.18$) and to have exchanged teaching ideas and materials ($r=.30$) than those who watched less. There seems little doubt that the higher degree of involvement had led to the increased interaction among participating audiences.

Table 7. Intercorrelations* among Involvement Measures and Interaction Indicators (N = 241).

	Telephone Calls	Mail Contacts	Classroom Experiment	Group Work	Exchange of Ideas
Television Viewings	.33	.31	.29	.18	.30
Telephone Calls	---	.72	.47	.19	.25
Mail Contacts	---	---	.51	.20	.25
Classroom Experiments	---	---	---	.16	.37
Group Work	---	---	---	---	.18

*r = .13 and r = .17 are significant at the 5% and the 1% levels respectively.

Student and Teacher Reaction

Ontario: Our Science Lab led students to become more aware of their surrounding environment, according to 91% of teachers, of whom 84% thought that participation in the project resulted in increased interest in science among their students, and 75% also felt that their involvement with the learning system caused them to become more interested in teaching science. There were no significant differences in any of these responses between the more active and less active groups. (See questions 13, 14, and 16 in Appendix A.)

The level of difficulty of the television series was considered to be just right for grades 4, 5 and 6 by 63% of teachers, though 27% thought it rather difficult. Only 11% of the teachers assessed the learning system as a whole as less than good -- and 23% thought it excellent. In addition, 91% of the teachers indicated that they were satisfied with the services provided, and 94% felt the *Science Lab* series with audience participation to be more "useful" than an ordinary television series. Again, there were no significant differences in each of the responses between the more active and less active groups. (See questions 17 to 20 in Appendix A.)

According to students' responses summarized in Appendix B, 62% indicated that they liked the *Science Lab* very much, and another 20% liked it quite a bit. Boys and lower grades liked the *Science Lab* more than girls and higher grades, though differences were not significant. The students' three favourite television programs were "Weatherwise. . . Otherwise," "Your Money or Your Life," and "Air Antics"; the three most liked experiments were "Paper Airplane Contest," "Survival Kit," and "The Search for Our Largest Tree."

The general enthusiasm for the learning system shown by participating audiences was reflected in the desire of 95% of the teacher sample to participate in the *Science Lab* project if it were offered again. No less than 90% would like to enroll in similar participatory television projects in other subject areas, such as social studies (68% of the entire sample), mathematics (34%), or language arts (24%). If there are to be future projects, it is important to note that 94% of the teachers wanted to have a Teachers' Guide to *Ontario: Our Science Lab*, in addition to the newsletters.

TEACHERS' COMMENTS

In addition to the findings of the special-purpose survey reported above, valuable comments on *Ontario: Our Science Lab* were obtained from evaluation cards.

Five times throughout the school year, the Research and Planning Branch sends evaluation cards to most elementary and secondary schools within the province. These cards, soliciting teachers' opinions on programs within any series they may have viewed, consist of eight specific questions on the pattern of program usage and a request for comments on program content, student reaction etc.

The total number of cards returned for all OECA series during the period in which *Science Lab* was broadcast, namely April and May 1973, was 877. The 222 returns for *Science Lab* represent a quarter of this total. The following

are the major findings of an analysis of those 222 cards, two-thirds of which referred to all or nearly all of the series.

Overall Rating: Respondents were asked to rate the programs on a four-point scale. Ninety-six percent of returns rated the series as good or excellent.

Level: The series was designed primarily for junior grades (4-6). Returns confirmed that 91% of viewers were within the junior level. Twelve percent of viewing grade 4 teachers declared that the series was too advanced for students at their teaching level.

Topic: The subject of weather, central to the series, was readily accepted because most experiments required little sophisticated or expensive equipment and programs dealt primarily with phenomena in the child's immediate environment. Ten percent of respondents hoped for the expansion of the series to include other subject areas such as Geography and History.

Presentation: "The experiments and instructions were simply and clearly described". This comment was typical of the 93% who indicated that the content of the program was easily understood. It was pointed out, however, that a visual summary at the end of the program, drawing together major conclusions, would increase the effectiveness.

Relation To Curriculum: Eighty-nine percent of teachers who commented, used the series in conjunction with the curriculum. Ninety-three percent felt that the series had been successful in helping them achieve their objectives.

Production: "The children enjoy the animated approach and find the concepts easy to understand". Twenty-four percent of teachers shared this view regarding the effectiveness of humour in stimulating interest without distracting.

Frequency: Fifteen percent of respondents found a week between programs too short. However, not every class was able to follow the example of a Bell Ewart teacher who devoted half of every school day to *Science Lab*. As a Toronto teacher commented:

> We find it difficult to complete these experiments with written notes in only one week. It might be a consideration for next year to space the programs at two-week intervals.

This would also give teachers greater opportunity to research topics in advance and obtain necessary materials. In one public school where the programs were videotaped, the teachers viewed each one twice to clear any controversial points raised in class discussions.

Length: Generally it was felt that the duration of the program was appropriate since it corresponded to the children's attention span.

Follow-up: Teachers were generally impressed with the amount of effort involved in the creation of "the well-thought-out" experiments. Thirty percent of respondents remarked on the enthusiasm with which their classes pursued activities related to the programs.

Interaction: The series was an experiment in two-way communication. The success of this objective is apparent in the comments of 25% of the viewing teachers who expressed appreciation of the active student involvement, and the "chance to talk back to your TV set".

Supplementary Material: Newsletter were well received according to the 83% who claimed to have used them and the 80% who indicated that they would use them again. Approximately 5% of teachers declared that they received the publications too late, feeling that materials should arrive at least one week prior to the program. A number of respondents also thought that newsletters summarized previous programs well but did not provide enough information on the upcoming one.

REFLECTIONS BY THE EDITOR

The *Ontario: Our Science Lab* pilot experience demonstrates specific roles which can be successfully played by a broadcast oriented provincial educational communications service in facilitating the teaching-learning process. Through provision of flexible opportunities (via broadcast, newsletter, phone, mail, personal contact) for prescribed, shared, as well as personalized learning modes, unique challenges and choices are opened, resources not otherwise available are provided, while at the same time local options are preserved and encouraged.

In support of the approach 94% of teachers responding to the follow-up questionnaire said that series based on audience participation are more "useful" than an ordinary educational television series. There were, however, several teachers who wanted to know more about what was involved by means of a teachers' guide distributed prior to the start of the series. Further comprehensive information about just what might be involved would be helpful.

Use of the phone was limited during the pilot due most likely to the constraints placed upon calling procedures as protection against jamming the system and against incurring project costs beyond means.

Rather than promoting use of the phone as a major interactive component it should perhaps be available as an open option and used in a concentrated manner to draw in a sample of local, regional observations and conclusions as required in accordance with content objectives. The major interactive component should be the student TV module. The most effective feedback method in the opinion of teachers as well as students was the TV module. The second most popular method was the newsletter. Both were presented in a somewhat informal style making optimum use of student and teacher produced slides, art works, photographs, audio tapes, and in some cases video tapes.

Use of the information bank concept other than as input to the TV module was also limited due, perhaps, to the pressures of meeting the basic needs of weekly production.

The original concept was much broader encompassing the services of library-trained personnel who could facilitate the functioning of a major information support mechanism to back up and enrich resource collections with student and teacher contributions as well as existing curriculum materials. The full bank concept did not prove to be practical under the circumstances.

A project of this nature must be well organized, provision for immediate response to student inquiries and contributions must be made (whether through television, by mail, or by the telephone) and an image and service given which indicates that OECA personnel care, respect the audience, and want to facilitate learning in whatever way possible. This in combination with an energetic and dynamic team involvement accounts in my opinion for the success of the endeavour.

APPENDIX A

Teacher Questionnaire and Marginals

from

Statistical Evaluation of Ontario: Our Science Lab (OECA), 1973)

by

Junichi Kawashima, Ph.D.

1. Which of the *Science Lab* television programs did your class view?

Program	More Active (N=119)	Less Active (N=112)	All (N=241)
1. The Ups and Downs of Water	93.3%	80.3%	86.7%
2. The Magdeburg Experiment	97.5	81.2	89.2
3. Haboobs, Mistrals, Chinooks and All That	96.6	81.2	88.8
4. Air Antics	99.2	80.3	89.6
5. Your Money or Your Life	99.2	74.6	86.7
6. Comfort	95.0	68.9	81.7
7. Brain vs. Brawn	96.6	68.0	82.2
8. Weatherwise...Otherwise	95.0	79.5	87.1
9. Making an Impression	90.8	67.2	78.8
10. Feeling Blue	85.7	59.0	72.2

2. Through which television facilities did your class view *Ontario: Our Science Lab*?

	More Active (N=119)	Less Active (N=122)	All (N=241)
B/W Receiver	94.1%	89.3%	91.7%
Colour Receiver	3.4	4.1	3.7
Video-tape Recorder	10.1	4.1	7.1
Other	0.8	0.0	0.4
No Response	0.0	2.5	1.3

3. During the 10 weeks of *Science Lab*, how often did your class report the results of experiments or activities by telephone?

Number of Telephone Calls	More Active (N=119)	Less Active (N=122)	All (N=241)
0	8.4%	74.6%	41.9%
1	3.4	12.3	7.9
2	10.1	9.0	9.5
3	13.5	3.3	8.3
4	14.3	0.8	7.5
5	10.9	---	5.4
6	11.8	---	5.8
7	6.7	---	3.3
8	10.9	---	5.4
9	5.0	---	2.5
10	0.8	---	0.4
11+	4.2	---	2.1

4. How often did your class mail in activity or experiment reports, during *Science Lab*?

Number of Letters Written	More Active (N=119)	Less Active (N=122)	All (N=241)
0	4.2%	76.2%	40.7%
1	3.4	9.8	6.6
2	9.2	7.4	8.3
3	12.6	4.1	8.3
4	12.6	0.8	6.6
5	14.3	---	7.1
6	10.1	1.6	5.8
7	6.7	---	3.3
8	13.5	---	6.6
9	3.4	---	1.7
10	2.5	---	1.3
11+	7.6	---	3.7

5. On average, how many *Science Lab* experiments or activities did your class perform each week?

Number of Experiments	More Active (N=119)	Less Active (N=122)	All (N=241)
0	0.0%	12.3%	6.2%
1	6.7	30.3	18.7
2	31.9	36.1	34.0
3	33.6	17.2	25.3
4	13.5	2.5	7.9
5+	14.3	1.6	7.9

6. Which method of *Science Lab* feedback would you say encouraged your class the most?

Feedback Method	More Active (N=119)	Less Active (N=122)	All (N=241)
Telephone Interaction	21.0%	7.4%	14.1%
Newsletter Feedback	21.0	25.4	23.2
Television Talkback	68.9	54.9	61.8
None of the Above	6.7	18.0	12.5
No Response	1.7	9.8	5.8

7. In your judgement, do students prefer to report results to *Science Lab* by telephone or by mail?

Reporting Preference	More Active (N=119)	Less Active (N=122)	All (N=241)
No Preference	26.9%	13.1%	19.9%
Telephone	35.3	12.3	23.7
Mail	33.6	16.4	24.9
Did Not Report	2.5	50.0	26.6
No Response	1.7	8.2	5.0

8. What percentage of your total classroom curriculum was devoted to *Science Lab* activities during the 10 weeks?

Degree of Involvement	More Active (N=119)	Less Active (N=122)	All (N=241)
0 - 25%	69.8%	89.3%	79.7%
26 - 50%	19.3	4.9	12.0
51 - 75%	5.0	2.5	3.7
76 - 100%	5.9	2.5	4.2
No Response	0.0	0.8	0.4

9. The following is a list of possible related activities. Which were performed by your class in connection with *Science Lab*?

Related Activities	More Active (N=119)	Less Active (N=122)	All (N=241)
Made Audio-Visual Materials	5.0%	4.1%	4.6%
Took Photographs	19.3	6.6	12.9
Paintings & Drawings	77.3	53.3	65.2
Writing Activities	72.3	51.6	61.8
Other	31.1	17.2	24.1
No Response	5.0	21.3	13.3

10. Did you find that your class participated in *Ontario: Our Science Lab* to the extent you would have liked?

Reasons	More Active (N=119)	Less Active (N=122)	All (N=241)
Yes	41.2%	15.6%	28.2%
No - No Television Facilities Available	0.0	0.8	0.4
No - Timetable Conflict	12.6	34.4	23.7
No - Material too difficult	5.0	10.7	7.9
No - Involved in other Projects	31.9	44.3	38.2
No - Other	18.5	20.5	19.5
No Response	0.0	1.6	0.8

11. Would you say that science resource books, available in school and public libraries, were used by your students more frequently during *Science Lab* than in previous weeks?

Increased Use of Resource Books	More Active (N=119)	Less Active (N=122)	All (N=241)
Yes	50.4%	45.9%	48.1%
No	48.7	44.3	46.5
No Response	0.8	9.8	5.4

12. Did you find that the nature of *Science Lab* activities...

Nature of Activities	More Active (N=119)	Less Active (N=122)	All (N=241)
Encouraged Individual Work	6.7%	11.5%	9.1%
Made Little Difference	16.8	22.1	19.5
Encouraged Group Work	79.0	60.7	69.7
No Response	0.0	11.5	5.8

13. In your opinion, did involvement with *Science Lab* cause students to become more aware of their surrounding environment?

Increased Awareness of Environment	More Active (N=119)	Less Active (N=122)	All (N=241)
Yes	95.0%	87.7%	91.3%
No	2.5	4.9	3.7
No Response	2.5	7.4	5.0

14. From a teacher's standpoint, did participation in *Science Lab* result in an increased interest in science by your students?

Increased Interest in Science	More Active (N=119)	Less Active (N=122)	All (N=241)
Yes	87.4%	81.2%	84.2%
No	8.4	9.8	9.1
No Response	4.2	9.0	6.6

15. Did you exchange teaching ideas, apparatus and resource materials with other teachers during *Science Lab* more frequently than in previous weeks?

Degree of Exchange	More Active (N=119)	Less Active (N=122)	All (N=241)
Yes	49.6%	32.8%	41.1%
No	50.4	63.9	57.3
No Response	0.0	3.3	1.7

16. Do you think that your involvement with *Science Lab* caused you to become more interested in teaching science?

Increased Interest	More Active (N=119)	Less Active (N=122)	All (N=241)
Yes	75.6%	74.6%	75.1%
No	22.7	18.0	20.3
No Response	1.7	7.4	4.6

17. Please rate the difficulty of *Ontario: Our Science Lab* as a television science series for Grades 4, 5 and 6.

Difficulty Rating	More Active (N=119)	Less Active (N=122)	All (N=241)
Too Difficult	0.8%	4.1%	2.5%
Rather Difficult	26.9	27.1	27.0
Just Right	65.6	60.7	63.1
Rather Easy	3.4	5.7	4.6
Too Easy	0.8	---	0.4
No Response	2.5	2.5	2.5

18. How would you rate the value of the *Science Lab* project as a learning experience for your students in the teaching area of science?

	More Active (N=119)	Less Active (N=122)	All (N=241)
Less Valuable	1.7%	4.1%	2.9%
As Valuable	40.3	48.4	44.4
More Valuable	55.5	44.3	49.8
No Response	2.5	3.3	2.9

19. Judging from your initial expectations of *Ontario: Our Science Lab* when you enrolled, were you satisfied with the services provided?

	More Active (N=119)	Less Active (N=122)	All (N=241)
Disappointed	4.2%	9.0%	6.6%
Satisfied	63.0	63.9	63.5
Delighted	31.1	23.8	27.4
No Response	1.7	3.3	2.5

20. How would you assess the *Ontario: Our Science Lab* project as a whole?

	More Active (N=119)	Less Active (N=122)	All (N=241)
Poor	0.0%	0.8%	0.4%
Fair	3.4	2.5	2.9
Average	8.4	6.6	7.5
Good	58.8	68.0	63.5
Excellent	27.7	18.9	23.2
No Response	0.8	3.3	2.1

21. Would you participate if *Ontario: Our Science Lab* were offered again at a later date?

	More Active (N=119)	Less Active (N=122)	All (N=241)
Yes	95.0%	95.9%	95.4%
No	1.7	3.3	2.5
No Response	3.4	0.8	2.1

22. In future, would you like to have a teacher's guide to *Science Lab* which outlines procedures, in addition to the *Science Lab* newsletters?

	More Active (N=119)	Less Active (N=122)	All (N=241)
Yes	91.6%	95.1%	93.4%
No	5.0	0.8	2.9
No Response	3.4	4.1	3.7

23. As a teacher, are television projects like *Science Lab*, which invite audience participation, more useful than a regular television series?

	More Active (N=119)	Less Active (N=122)	All (N=241)
Yes	95.8%	91.8%	93.8%
No	0.8	3.3	2.1
No Response	3.4	4.9	4.2

24. Would you like to enroll in similar participatory television projects in other subject areas? If yes, in which subject area?

	More Active (N=119)	Less Active (N=122)	All (N=241)
Yes	95.8%	84.4%	90.0%
No	3.4	8.2	5.8
No Response	0.8	7.4	4.2
If "yes, in which subject area".			
Arts & Crafts	8.8	7.8	8.3
Language Arts	24.6	29.1	26.7
Mathematics	35.1	39.8	37.3
Music	2.6	2.9	2.8
Physical Education	8.8	3.9	6.5
Science	4.4	2.9	3.7
Social Studies	76.3	73.8	75.1
French	0.9	1.9	1.4
No Response	7.0	23.3	14.8

25. Please comment on aspects of *Science Lab* you liked and disliked, offering any suggestions as to how the project could be improved or used in connection with other topics.

	More Active		Less Active		All	
	Liked (N=42)	Disliked (N=19)	Liked (N=31)	Disliked (N=19)	Liked (N=73)	Disliked (N=38)
Longer Feedback Module	0.0%	5.3%	6.4%	0.0%	2.7%	2.6%
Like to Know Content Earlier	26.2	10.5	19.3	42.1	23.3	26.3
Need Teachers' Guide	14.3	5.3	12.9	15.8	13.7	10.5
Programs Farther Apart	14.3	10.5	6.4	21.0	10.9	15.8
Programs Repeated	4.8	0.0	3.2	0.0	4.1	0.0
Programs In French	0.0	0.0	3.2	5.3	1.4	2.6
More Experiments	0.0	5.3	6.4	5.3	2.7	5.3
Shorter Time Span	4.8	0.0	0.0	0.0	2.7	0.0
No Response	57.1	68.4	54.8	26.3	56.2	47.4

APPENDIX B

Student Questionnaire and Marginals

1. Which 3 *Science Lab* television programs did you like most?

TV Programs Most Liked	Boys (N=308)	Girls (N=326)	All (N=634)
1. The Ups and Downs of Water	31.5%	33.7%	32.7%
2. The Magdeburg Experiment	8.4	6.8	7.6
3. Haboobs, Mistrals, Chinooks and All That	10.1	9.8	9.9
4. Air Antics	40.9	20.3	30.3
5. Your Money or Your Life	53.6	59.2	56.5
6. Comfort	29.2	29.5	29.3
7. Brain vs. Brawn	26.3	21.2	23.7
8. Weatherwise...Otherwise	57.1	67.5	62.5
9. Making an Impression	9.7	11.4	10.6
10. Feeling Blue	23.7	31.6	27.8
No Response	0.7	0.3	0.5

2. Which 3 *Science Lab* television programs did you like most?

TV Programs Most Liked	Gr. 3-4 (N=226)	Gr. 5 (N=194)	Gr. 6-7 (N=216)	All (N=636)
1. The Ups and Downs of Water	37.6%	32.0%	28.2%	32.7%
2. The Magdeburg Experiment	10.2	4.6	7.9	7.7
3. Haboobs, Mistrals, Chinooks and All That	11.5%	9.8	9.7	10.4
4. Air Antics	32.3	29.4	29.2	30.4
5. Your Money or Your Life	52.2	58.8	58.3	56.3
6. Comfort	31.9	28.4	27.8	29.4
7. Brain vs. Brawn	10.2	26.8	34.7	23.6
8. Weatherwise...Otherwise	61.1	61.9	64.4	62.4
9. Making an Impression	11.1	11.9	9.3	10.7
10. Feeling Blue	27.4	28.9	26.9	27.7
No Response	0.4	0.5	0.5	0.5

3. Of the 3 answers you checked which program did you like best?

TV Program Most Liked	Boys (N=308)	Girls (N=326)	All (N=634)
1. The Ups and Downs of Water	5.2%	4.3%	4.7%
2. The Magdeburg Experiment	2.9	1.2	2.1
3. Haboobs, Mistrals, Chinooks and All That	1.3	1.5	1.4
4. Air Antics	15.6	6.1	10.7
5. Your Money or Your Life	20.5	20.9	20.7
6. Comfort	7.8	11.0	9.5
7. Brain vs. Brawn	4.6	4.3	4.4
8. Weatherwise...Otherwise	21.4	25.5	23.5
9. Making an Impression	0.7	1.5	1.1
10. Feeling Blue	10.1	10.7	10.4
No Response	10.1	12.9	11.5

4. Of the 3 answers you checked which program did you like best?

TV Program Most Liked	Gr. 3-4 (N=226)	Gr. 5 (N=194)	Gr. 6-7 (N=216)	All (N=636)
1. The Ups and Downs of Water	5.8%	3.1%	5.1%	4.7%
2. The Magdeburg Experiment	2.7	1.0	2.3	2.0
3. Haboobs, Mistrals, Chinooks and All That	0.0	2.6	2.3	1.6
4. Air Antics	8.9	12.4	11.6	10.9
5. Your Money or Your Life	20.8	20.6	20.4	20.6
6. Comfort	11.5	6.7	10.2	9.6
7. Brain vs. Brawn	1.8	3.6	7.9	4.4
8. Weatherwise...Otherwise	19.5	28.9	22.7	23.4
9. Making an Impression	1.3	0.5	1.4	1.1
10. Feeling Blue	12.8	10.3	7.9	10.4
No Response	15.0	10.8	8.3	11.5

5. How much did you like *Science Lab*?

Extent of Liking *Science Lab*	Boys (N=308)	Girls (N=326)	All (N=634)
Didn't Like at All	2.0%	0.6%	1.3%
Didn't Like Very Much	2.0	5.5	3.8
Liked all Right	10.1	15.3	12.8
Liked Quite a Bit	19.8	19.3	19.6
Liked Very Much	65.3	58.9	62.0
No Response	1.0	0.3	0.6

6. How much did you like *Science Lab*?

Extent of Liking *Science Lab*	Gr. 3-4 (N=226)	Gr. 5 (N=194)	Gr. 6-7 (N=216)	All (N=636)
Didn't Like at All	0.9%	1.6%	1.4%	1.3%
Didn't Like Very Much	1.8	4.6	5.6	3.9
Liked All Right	5.8	12.4	20.4	12.7
Liked Quite a Bit	15.9	19.1	23.6	19.5
Liked Very Much	73.9	62.4	49.1	62.0
No Response	1.8	0.0	0.0	0.6

7. Which of these *Science Lab* experiments or activities did you do on your own out of school?

Out of School Activities	Boys (N=323)	Girls (N=286)	All (N=609)
1. Classroom Humidity	11.2%	11.5%	11.3%
2. Outside Humidity	10.5	5.9	8.4
3. Moisture in Foods	17.0	24.1	20.4
4. Pressure of Class on Earth	7.7	7.0	7.4
5. Air Pressure Readings	8.7	9.1	8.9
6. Skin Sensitivity	17.3	23.1	20.0
7. Water Cup Mystery	13.3	14.7	14.0
8. Prevailing Wind	16.7	11.9	14.5
9. Wind Speed	18.0	16.1	17.1
10. Beaufort Scale	6.2	7.3	6.7
11. Paper Airplane Contest	43.7	41.3	42.5
12. Air Currents	8.4	9.4	8.9
13. Cloud Types	14.9	22.0	18.2
14. Colour Effects Temperature	9.0	11.5	10.2
15. The Search for our Largest tree	32.5	30.1	31.4
16. Survival Kit	23.8	25.2	24.5
17. Insulating Materials	6.5	3.9	5.3
18. Discussion of Favourite Experiment	5.6	15.0	10.0
19. Bird Migration	17.0	11.5	14.5
20. Pollution Consciousness	13.3	15.7	14.5
21. Your Own Thing	17.7	18.9	18.2
22. No Experiments out of school	28.2	30.8	29.4

8. Which of these *Science Lab* experiments or activities did you do on your own out of school?

Out of School Activities	Gr. 3-4 (N=177)	Gr. 5 (N=232)	Gr. 6-7 (N=206)	All (N=615)
1. Classroom Humidity	12.4%	9.5%	12.6%	11.4%
2. Outside Humidity	14.7	8.2	3.4	8.5
3. Moisture in Foods	18.1	23.7	18.9	20.5
4. Pressure of Class on Earth	11.9	5.6	6.3	7.6
5. Air Pressure Readings	9.0	9.1	10.2	9.4
6. Skin Sensitivity	19.2	19.0	22.8	20.3
7. Water Cup Mystery	17.0	13.8	12.1	14.2
8. Prevailing Wind	22.0	10.8	13.6	15.0
9. Wind Speed	20.3	18.5	13.1	17.2
10. Beaufort Scale	7.4	6.0	7.3	6.8
11. Paper Airplane Contest	46.9	41.8	35.9	41.3
12. Air Currents	11.3	10.8	5.3	9.1
13. Cloud Types	17.5	20.7	11.2	16.6
14. Colour Effects Temperature	10.2	13.4	6.8	10.2
15. The Search for our Largest Tree	33.3	31.9	30.6	31.9
16. Survival Kit	25.4	33.2	15.1	24.9
17. Insulating Materials	5.7	8.2	1.9	5.4
18. Discussion of Favourite Experiment	11.3	13.4	5.3	10.1
19. Bird Migration	17.0	16.8	10.7	14.8
20. Pollution Consciousness	22.0	12.5	10.7	14.6
21. Your Own Thing	13.6	19.4	20.9	18.2
22. No Experiments out of school	30.5	27.2	30.6	29.3

9. Which *Science Lab* experiments or activities did you like most?

Activities Most Liked	Boys (N=289)	Girls (N=311)	All (N=600)
1. Classroom Humidity	10.4%	4.5%	7.3%
2. Outside Humidity	6.9	3.5	5.2
3. Moisture in Foods	14.2	32.2	23.5
4. Pressure of Class on Earth	10.0	16.7	13.5
5. Air Pressure Readings	8.3	3.5	5.8
6. Skin Sensitivity	18.0	26.1	22.2
7. Water Cup Mystery	13.2	16.7	15.0
8. Prevailing	9.0	5.8	7.3
9. Wind Speed	17.0	10.0	13.3
10. Beaufort Scale	2.1	1.9	2.0
11. Paper Airplane Contest	66.4	49.8	57.8
12. Air Currents	4.8	5.2	5.0
13. Cloud Types	9.7	11.6	10.7
14. Colour Effects Temperature	6.6	14.2	10.5
15. The Search for our Largest Tree	31.1	26.4	28.7
16. Survival Kit	35.3	28.9	32.0
17. Insulating Materials	1.7	3.9	2.8
18. Discussion of Favourite Experiment	3.8	1.0	2.3
19. Bird Migration	12.1	9.7	10.8
20. Pollution Consciousness	11.4	18.0	14.8
21. Your Own Thing	11.1	14.8	13.0
22. No Response	0.4	0.6	0.5

10. Which *Science Lab* experiments or activities did you like most?

Activities Liked Most	Gr. 3-4 (N=201)	Gr. 5 (N=187)	Gr. 6-7 (N=600)	All (N=600)
1. Classroom Humidity	10.0%	6.4%	6.1%	7.5%
2. Outside Humidity	6.5	7.5	3.3	5.7
3. Moisture in Foods	28.4	17.1	25.0	23.7
4. Pressure of Class on Earth	10.5	10.7	19.8	13.8
5. Air Pressure Readings	7.0	5.9	4.7	5.8
6. Skin Sensitivity	17.4	18.7	29.7	22.2
7. Water Cup Mystery	16.9	15.0	13.2	15.0
8. Prevailing Wind	10.5	4.3	7.1	7.3
9. Wind Speed	11.0	19.3	10.4	13.3
10. Beaufort Scale	1.5	2.1	2.4	2.0
11. Paper Airplane Contest	52.2	60.4	63.2	58.7
12. Air Currents	5.5	4.8	4.7	5.0
13. Cloud Types	8.5	13.9	11.8	11.3
14. Colour Effects Temperature	12.9	9.6	9.4	10.7
15. The Search for our Largest Tree	25.4	25.1	35.9	29.0
16. Survival Kit	29.4	41.2	26.9	32.2
17. Insulating Materials	3.5	3.7	1.4	2.8
18. Discussion of Favourite Experiment	2.5	2.7	1.9	2.3
19. Bird Migration	12.9	10.2	9.4	10.8
20. Pollution Consciousness	19.9	11.2	13.7	15.0
21. Your Own Thing	11.9	10.2	17.5	13.3
22. No Response	0.0	1.1	0.5	0.5

11. Of the 3 answers you checked, which experiment did you like best?

Experiment Liked Best	Boys (N=289)	Girls (N=311)	All (N=600)
1. Classroom Humidity	0.4%	1.0%	0.7%
2. Outside Humidity	0.4	0.6	0.5
3. Moisture in Foods	0.7	5.8	3.3
4. Pressure of Class on Earth	0.7	3.2	2.0
5. Air Pressure Readings	1.7	0.3	1.0
6. Skin Sensitivity	2.1	7.7	5.0
7. Water Cup Mystery	1.0	3.2	2.2
8. Prevailing Wind	2.8	1.0	1.8
9. Wind Speed	3.8	1.3	2.5
10. Beaufort Scale	0.4	0.0	0.2
11. Paper Airplane Contest	32.9	17.0	24.7
12. Air Currents	0.4	1.0	0.7
13. Cloud Types	1.4	1.0	1.2
14. Colour Effects Temperature	0.4	5.2	2.8
15. The Search for our Largest Tree	9.0	5.8	7.3
16. Survival Kit	9.7	12.5	11.2
17. Insulating Materials	0.0	1.0	0.5
18. Discussion of Favourite Experiments	0.0	0.3	0.2
19. Bird Migration	1.4	1.3	1.3
20. Pollution Consciousness	2.8	5.8	4.3
21. Your Own Thing	2.1	1.6	1.8
22. No Response	26.3	23.5	24.8

12. Of the 3 answers you checked, which experiment did you like best?

Experiment Liked Best	Gr. 3-4 (N=201)	Gr. 5 (N=187)	Gr. 6-7 (N=212)	All (N=600)
1. Classroom Humidity	1.5%	0.0%	0.5%	0.7%
2. Outside Humidity	1.0	1.1	0.0	0.7
3. Moisture in Foods	4.0	0.5	5.7	3.5
4. Pressure of Class on Earth	1.0	1.6	3.3	2.0
5. Air Pressure Readings	1.0	1.1	0.9	1.0
6. Skin Sensitivity	2.5	3.2	9.0	5.0
7. Water Cup Mystery	1.5	1.1	3.8	2.2
8. Prevailing Wind	2.5	0.5	2.4	1.8
9. Wind Speed	1.0	4.8	1.9	2.5
10. Beaufort Scale	0.0	0.0	0.5	0.2
11. Paper Airplane Contest	20.4	28.3	25.5	24.7
12. Air Currents	0.5	0.5	0.9	0.7
13. Cloud Types	0.0	1.1	2.8	1.3
14. Colour Effects Temperature	4.0	2.1	2.4	2.8
15. The Search for our Largest Tree	5.5	5.9	10.4	7.3
16. Survival Kit	10.5	15.5	8.0	11.2
17. Insulating Materials	0.0	1.1	0.5	0.5
18. Discussion of Favourite Experiment	0.0	0.5	0.0	0.2
19. Bird Migration	2.0	1.1	0.9	1.3
20. Pollution Consciousness	6.0	2.7	4.3	4.3
21. Your Own Thing	1.0	0.5	3.8	1.8
22. No Response	34.3	27.8	15.1	25.5

APPENDIX B

Sample Newspaper Coverage

'It's real science, not just reading about science'

TV makes science fun to learn

By Jay Bryan
Staff Writer

It was a gusty spring morning as the Grade 5 pupils from Agincourt's Lynngate Junior Public School trooped outdoors to measure wind speed with ping-pong balls and protractors.

At the same time, Grade 4, 5 and 6 pupils at Calico Public School in Downsview were carrying out the same ritual.

The two schools are participating, along with several hundred others in Ontario, in an unusual new educational television production called Ontario: Our Science Lab.

About 70 elementary schools in Scarboro and North York are involved in the program which, unlike some past ETV efforts, seems to have found a successful way to mix fun and education.

Barbara Fersht, a Grade 5 teacher at Lyngate, says the program has become a hit with her students in the few weeks since it began "because it's real science. It's not just reading about science."

And Aime Meriheim, a teacher who helps co-ordinate the Science Lab program at Calico Public School, says her pupils "are really eager to get into it and get started" after watching each of the weekly broadcasts.

Both teachers agree that the program sparks far more student enthusiasm than a textbook assignment ever did.

Each Wednesday's Science Lab broadcast begins with a chunk of scientific theory—meteorology, biology, environmental studies—in an easily digestible format including

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SCIENCE LAB director Jason Helleman works with technician Bob Stroud and production assistant Susan Clery during a taping session for the program's "feedback" segment.

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Show involves pupils in science

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cartoon segments and explanations by the show's host and sometime wisecracking humorist, Nick Nichols.

Viewers also get instructions, on the program and in a weekly newsletter, for putting their new knowledge to use in a series of experiments carried out with simple, home-made equipment.

The results, which student experimenters report by mail and telephone, are co-ordinated by Science Lab staff and broadcast in the final segment of each week's program.

The students, all in Grades 4, 5 or 6, collected information in one recent week which the program staff used to make a map of humidity conditions across Ontario.

Their humidity readings were impressively close to those collected by government meteorologists in the same time period.

An example of the kind of equipment they used is sitting in Mrs. Fersht's classroom.

It's called a hair hygrometer, and it

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e Scarborough Mirror, April 25, 1973

Bradford Witness, Ont.
March 28, 1973

Bradford area students learn science by television

Students from six area elementary schools will join more than 80,000 other Ontario youngsters in one giant science laboratory Wednesday morning with the aid of classroom televisions.

"Ontario: Our Science Lab" is a completely new approach to science that will require students in grades four, five and six to do things such as compare weather phenomena across the province; watch bird migration; conduct experiments inside and outside their classrooms. The central theme for the series is weather and environment. More than 2,000 classrooms in 900 elementary schools across Ontario are involved.

The participating schools in this area are Bradford Public School, St. Mary's Separate School, Innisfil Central School, Sunnybrae Public School, Tecumseth Central Public School and Tottenham Public School.

Following the experiments, the students will phone or mail the results to science lab headquarters in Toronto. Toll-free telephone lines have been connected to a special Ontario Educational Communications Authority switchboard to handle the calls.

Periodic newsletters will be sent to the children to keep them informed of the results of the experiments in other areas of Ontario.

Project co-ordinator Bob Tilroe says science lab will use student curiosity to stimulate learning.

"The young people will try to find out why human joints creak in damp weather; why air pressure differs between Thunder Bay and Mount Forrest; how a hand pump draws water from a well, and the why of the old sailors' saying, 'Red sky in the morning, sailors take warning; red sky at night, sailors' delight'."

Grade five teacher at St. Mary's Separate School, Henry Gabriels, said the science lab sounds interesting.

"It's a different approach to science. The students are able to see the effects of their experiments and they are working with the media of television and telephone," he said.

"Science for the elementary grades is dry stuff. The students study something and they know it. Experiments of this type (in the television program) are usually relegated to chemistry or physics. If the students get used to the method of experimenting now, it may be easier for them when they continue into high school and other areas of science," Mr. Gabriels added.

Pat Hudson, who teaches grades five and six at Bradford Public School, said the students are enthusiastic about the science program. She said she isn't quite sure what to expect because the experiments the class has done so far in preparation for the program are unrelated, but, she added, she hopes the program will tie it together.

Leamington Post & News, Ont.
March 28, 1973

Who says television isn't being used in classrooms of Ontario?

More than 80,000 Ontario youngsters will make Ontario into one giant science laboratory with the aid of their classroom television set beginning today.

In more than 2,000 classrooms in 900 elementary schools, a student was delegated to switch on the television set at precisely 9.14 a.m. At exactly 9.15 a.m. on Channel 19 in Toronto, and the CBC Ontario Network a new action-packed junior science series appropriately entitled "Ontario: Our Science Lab", began.

Pupils in three Leamington area elementary schools will be participating in the project, St. Michael's, Selkirk and Mount Carmel.

Other district schools taking part are Gosfield North Central, Jack Miner and Kingsville.

Science Lab is a completely new approach that will require students in Grades four, five and six to do things: compare weather phenomena across the province; watch bird migration; conduct real experiments inside and outside their classrooms. Central theme for the series is weather and environment.

Students will then phone or mail the results of their experiments — with pictures when possible—to science lab headquarters in Toronto. Toll-free telephone lines have been connected to a special OECA switchboard to handle thousands of phone calls expected.

And that's not all there is to the show. The last five minutes of each program will in effect allow the children to talk back to the television set for the first time.

This talk back segment will include results of experiments suggested in the previous program and will feature actual photographs and television coverage of some of the more interesting projects and the young scientists involved.

Television and telephones aren't the only media involved. Teachers will receive printed guidelines to help them conduct classroom activities connected with the series; a periodic newletter will be sent to the children; local resources such as libraries will be utilized.

Project co-ordinator Bob Tilroe says science lab will use student curiosity to stimulate learning. The young people will try to find out why human joints creak in damp weather; why air pressure differs between Thunder Bay and Mount Forest; how does a hand pump draw water from a well: why the old sailors' saying "Red Sky in the morning, sailors take warning; red sky at night, sailors delight?"

The series is produced by Paul Marquardt with educational input from David Chamberlain and weather advice from Percy Saltzman.

Program Information:

1 — The Ups and Downs of Water — An illustration of the water cycle as it affects all forms of life in Ontario, starting with the human body. (March 28).

2 — The Magdeburg Experiment — A study of atmospheric pressure including an experiment in 1672 when two horses tried to pull apart two halves of a sphere which were held together solidly by a vacuum. (April 4).

3 — Haboobs, Mistrals, Chinooks and All That — The effects of gentle and violent atmospheric motion. (April 11).

4 — Air Antics — How air movement varies from place to place and what happens when air fronts collide. (April 18).

5 — Your Money or Your Life — Each year, around the world, tornadoes, hurricanes and forest fires destroy homes and claim many lives. Who gets the most snow in Ontario? If you were lost in the winter deep in the woods would you know how to survive? (April 25).

6—When You're Hot You're Hot —Hot hot is a hot day? How much hotter is a hot bath? This program offers some temperature surprises. (May 2).

7 — Brain vs Brawn — All life must cope with the weather. Some animals cope well; others poorly. How do we prepare to meet changing weather? (May 9).

8 — Weatherwise . . . Otherwise — An exploration of the myths and realities of weather. (May 16).

9 — Making an Impression — Man's influence on his environment and the problems that result. (May 23).

10 — Feeling Blue — Does weather affect the way we feel? (May 30).

Winchester Press, Ont.
April 26, 1973

V470 "Ontario Our Science Lab"

Television Proves Helpful Ontario Teaching Asset

More than 80,000 Ontario youngsters are making Ontario into one giant science laboratory with the aid of their classroom television sets.

In more than 2,000 classrooms in 900 elementary schools, a student is delegated to turn on the set at a certain time and classes immediately become involved in the new action-packed junior science series appropriately entitled "Ontario Our Science Lab".

The first program was aired on March 28th; another on April 4th and continue each Wednesday morning till May 30th.

Science Lab is a completely new approach that requires students in Grades four, five and six to do things: compare weather phenomena across the province; watch bird migration; conduct real experiments inside and outside their classrooms. Central theme for the series is weather and environment.

Students phone or mail results of their experiments - with pictures when possible - to science lab headquarters in Toronto. Toll-free telephone lines have been connected to a special OECA switchboard to handle thousands of phone calls.

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The series is produced by Paul Marquardt with educational input from David Chamberlain and weather advice from Percy Saltzman.

Teacher reaction in the district is mixed. One teacher suggested he was discouraged by the fact technical difficulties always seem to interfere while another was very impressed by the experiment and reported his classes keenly interested.

Mercury-Advance
Renfrew, Ont.
May 16, 1973

Garbage pickers at work

Anyone for picking garbage?

This was the scene on Wednesday afternoon in the Grade 6 science class of Graham Lloyd at Victoria school.

The object of this experiment was to make the children more conscious of pollution and was done in connection with a 10 Science Lab series being conducted by the Ontario Educational Communications Authority, Toronto.

Science Lab is a new approach that will require students to compare weather phenomena across the province, watch bird migration, conduct real experiments inside and outside their classrooms. Central theme for the series is weather and environment.

The series is viewed every Wednesday morning on Channel 13 from 11 to 11:20 am. The first half of the program usually constitutes a new experiment and the last five minutes is a resume of the previous experiment from the 900 elementary schools which have been participating.

The project conducted last Wednesday, May 9, was the 8th in the series. The 24 children in the class gathered the garbage in a large container that was left around Victoria school at noon hour.

The garbage was then weighed, dumped on the floor and sorted into four categories, re-cycleable, composted, non recycleable and unuseable items.

The class was split into small groups and each one had a certain pile of garbage to sort. The eyes of many of the children were opened to see that large amounts of eatable food was thrown away. There were many "ohs", sighs and comments and the girls proved to be far more willing to dig in and get the job done than were the boys.

After all this sorting and discussion the final results were tabulated by this Grade 6 class and showed: re-cycleable, 2½ lbs or 27.2 per cent; composted, 6¼ lbs or 70.7 per cent; non-recycleable, 3 oz or 2.1 per cent and unnecessary items, 7 straws, all for a total of 9 lb, 3 oz. These will be phoned to Toronto on Monday for tabulation.

Total this for every school day and you will be amazed at the total of garbage that is accumulated around the school grounds in a year.

Mercury-Advance
Renfrew, Ont.
May 16, 1973

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Scott Edwards and Doug Forgie appear very distressed as they sort garbage for the second time in their Grade 6 class room at Victoria school. All part of a science pollution project.

Mercury-Advance,
Renfrew, Ont.
May 16, 1973

"I simply can't stand the smell another minute" mumbles Elaine Jancar as she sorts the garbage all part of a class room science project.